

What Is Claimed Is:

1 1. A system comprising:
2 a process chamber having a feed inlet, a
3 low pressure outlet and a high pressure outlet;
4 a feed pump;
5 a common shaft having rotatably coupled
6 thereto a booster pump fluidically coupled between
7 said feed pump and said feed inlet and an energy
8 recovery turbine fluidically coupled to said high
9 pressure outlet through a first channel, said energy
10 recovery turbine drives said booster pump; and
11 a second channel fluidically coupling said
12 process chamber and said high pressure outlet.

1 2. A system as recited in claim 1 wherein
2 said process chamber has a first reverse osmosis
3 membrane therein.

1 3. A system as recited in claim 1 wherein
2 said low pressure outlet comprises a permeate outlet.

1 4. A system as recited in claim 1 wherein
2 said high pressure outlet comprises a concentrate
3 outlet.

1 5. A system as recited in claim 1 further
2 comprising a first control valve coupled between said
3 booster pump and said feed pump.

1 6. A system as recited in claim 1 further
2 comprising a second control valve coupled within said

3 second channel and directing concentrate between said
4 feed pump and said booster pump.

1 7. A system as recited in claim 1 further
2 comprising a jet pump fluidically coupled to the
3 second channel to couple the high pressure outlet to
4 said feed pump outlet.

1 8. A system as recited in claim 7 wherein
2 said jet pump ¹⁴² is coupled between said feed pump and
3 said booster pump.

1 9. A system as recited in claim 8 wherein
2 said jet pump is coupled between said booster pump
3 and said process chamber.

1 10. A reverse osmosis system comprising:
2 a reverse osmosis process chamber having a
3 first feed inlet, a first permeate outlet and a first
4 concentrate outlet;
5 a feed pump;
6 a common shaft having rotatably coupled
7 thereto a booster pump fluidically coupled between
8 said feed pump and said first feed inlet and an
9 energy recovery turbine fluidically coupled to said
10 first concentrate outlet through a first channel,
11 said energy recovery turbine driving said booster
12 pump; and

13 a second channel coupled to said first
14 concentrate outlet for directing a portion of said
15 concentrate between said booster pump and said feed
16 inlet.

1 11. A system as recited in claim 10
2 wherein said second channel directs concentrate
3 between said feed pump and said energy recovery
4 turbine.

1 12. A system as recited in claim 10
2 wherein said second channel directs said concentrate
3 between said energy recovery turbine and said process
4 chamber.

1 13. A system as recited in claim 10
2 further comprising a jet pump coupling said second
3 channel to said feed pump outlet.

1 14. A system as recited in claim 13
2 wherein said jet pump is coupled between said feed
3 pump and said booster pump.

1 15. A system as recited in claim 13
2 wherein said jet pump is coupled between said booster
3 pump and said process chamber.

1 16. A method of operating a process having
2 a feed pump directing fluid to a process chamber
3 having a high pressure outlet and a low pressure
4 outlet comprising the steps of:

5 boosting a pressure of fluid output from a
6 feed pump prior to entering to a first process
7 chamber (using) from a first portion of a high pressure
8 fluid from a high pressure outlet of a first process
9 chamber;

10 recirculating a second portion of the high
11 pressure fluid; and

12 fluidically coupling the second portion of
13 the high pressure fluid between the feed pump and the
14 process chamber.

1 17. A method as recited in claim 16
2 further comprising the steps of providing first
3 energy recovery turbine coupled to a booster pump to
4 preform the step of boosting.

1 18. A method as recited in claim 16
2 further comprising the steps of providing a jet pump
3 to preform the step of fluidically coupling.

1 19. A method as recited in claim 16
2 further comprising the steps of fluidically coupling
3 a pumped fluid input of the jet pump to the second
4 portion of high pressure fluid and fluidically
5 coupling a driving fluid input to fluid output from
6 the feed pump.

1 20. A method as recited in claim 16
2 further comprising the steps of fluidically coupling
3 a pumped fluid input of the jet pump to fluid output
4 from the feed pump and fluidically coupling a driving
5 fluid input to the second portion of high pressure
6 fluid.